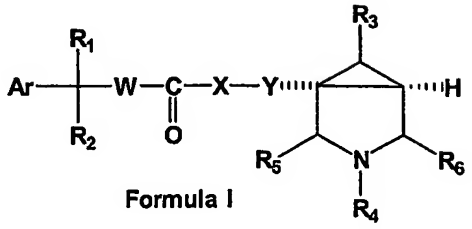
We Claim

1. Compounds having the structure of Formula I



Formula I

and their pharmaceutically acceptable salts, pharmaceutically acceptable solvates, esters, enantiomers, diastereomers, N-oxides, polymorphs, or metabolites, wherein

Ar represents an aryl or a heteroaryl ring having 1-2 hetero atoms selected from the group consisting of oxygen, sulphur and nitrogen atoms, the aryl or heteroaryl rings may be unsubtituted or substituted by one to three substituents independently selected from lower alkyl (C_1-C_4), lower perhaloalkyl (C_1-C_4), cyano, hydroxy, nitro, halogen (e.g. F, Cl, Br, I), lower alkoxy (C_1-C_4), lower perhaloalkoxy (C_1-C_4), unsubstituted amino, N-lower alkylamino (C_1-C_4) or N-lower alkylamino carbonyl (C_1-C_4);

R_1 represents a hydrogen, hydroxy, hydroxymethyl, amino, alkoxy, carbamoyl or halogen (e.g. fluorine, chlorine, bromine and iodine);

R_2 represents hydrogen, alkyl, C_3-C_7 cycloalkyl ring, a C_3-C_7 cycloalkenyl ring, an aryl or a heteroaryl ring having 1-2 hetero atoms selected from the group consisting of oxygen, sulphur and nitrogen atoms, the aryl or a heteroaryl ring may be unsubstituted or substituted by one to three substituents independently selected from lower alkyl (C_1-C_4), cyano, hydroxy, nitro, lower alkoxycarbonyl, halogen, lower alkoxy (C_1-C_4), lower perhaloalkoxy (C_1-C_4), unsubstituted amino, N-lower alkylamino (C_1-C_4), N-lower alkyl amino carbonyl (C_1-C_4);

W represents $(CH_2)_p$, where p represents 0 to 1;

X represents an oxygen, sulphur, -NR or no atom, wherein R represents H or alkyl;

Y represents $(CH_2)q$ wherein q represents 0 to 1;

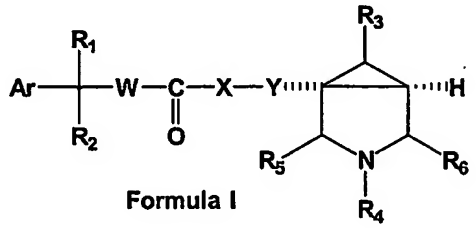
R_3, R_5 and R_6 are independently selected from H, lower alkyl, COOH, $CONH_2$, NH_2, CH_2NH_2; and

R_4 represents hydrogen, C_1-C_{15} saturated or unsaturated aliphatic hydrocarbon (straight chain or branched) in which any 1 to 6 hydrogen atoms may be substituted with the group independently selected from halogen, arylalkyl, arylakenyl, heteroarylalkyl or heteroarylalkenyl, having 1-2 hetero atoms selected from the group consisting of nitrogen, oxygen and sulphur atoms with an option that any 1 to 3 hydrogen atoms on the ring in said arylalkyl, arylalkenyl, heteroarylalkyl, heteroarylalkenyl group may be substituted with lower alkyl (C_1-C_4), lower perhaloalkyl (C_1-C_4), cyano, hydroxy, nitro, lower alkoxycarbonyl, halogen, lower alkoxy (C_1-C_4), lower perhalo alkoxy (C_1-C_4), unsubstituted amino, N-lower alkylamino (C_1-C_4), or N-lower alkylamino carbonyl (C_1-C_4).

2. A compound selected from the group consisting of
(1α, 5α)-[3-benzyl-3-azabicyclo[3.1.0]-hex-1-(methyl)-yl]-2-hydroxy-2,2-diphenylcarboxylic ester (Compound No.1)
(1α, 5α)-[3-benzyl-3-azabicyclo[3.1.0]-hex-1-(methyl)-yl]-2-hydroxy-2-cyclohexyl-2-phenylcarboxlic ester (Compound No.2)
(1α, 5α)-[3-benzyl-3-azabicyclo[3.1.0]-hex-1-(methyl)-yl]-2-hydroxy-2-cyclopentyl-2-phenylcarboxylic ester (Compound No.3)
(1α, 5α)-[3-benzyl-3-azabicyclo[3.1.0]-hex-1-yl]-2-hydroxymethyl-2-phenylacitamide (Compound No.4)
(1α, 5α)-[3-benzyl-3-azabicyclo [3.1.0]-hex-1-yl]-2-hydroxy-2,2-diphenylacetamide (Compound No.5)
(1α, 5α)-[3-(2-methyl-2-pentenyl)-3-azabicyclo[3.1.0]-hex-1-(methyl)-yl]-2-hydroxy-2-cyclohexyl-2-phenylcarboxylic ester (Compound No.6)
(1α, 5α)-[3-(3,4-methylenedioxyphen)ethyl-3-azabicyclo[3.1.0]-hex-1-(methyl)-yl]-2-hydroxy-2-cyclohexyl-2-phenylcarboxylic ester (Compound No.7).

3. A pharmaceutical composition comprising a therapeutically effective amount of a compound as defined in claim 1 or 2 optionally together with pharmaceutically acceptable carriers, excipients or diluents.

4. A method for treatment or prophylaxis of an animal or a human suffering from a disease or disorder of the respiratory, urinary and gastrointestinal systems, wherein the disease or disorder is mediated through muscarinic receptors, comprising administering to said animal or human, a therapeutically effective amount of a compound having the structure of Formula I,



Formula I

and its pharmaceutically acceptable salts, pharmaceutically acceptable solvates, esters, enantiomers, diastereomers, N-oxides, polymorphs, metabolites, wherein Ar represents an aryl or a heteroaryl ring having 1-2-hetero atoms selected from the group consisting of oxygen, sulphur and nitrogen atoms, the aryl or heteroaryl rings may be unsubtituted or substituted by one to three substituents independently selected from lower alkyl (C_1-C_4), lower perhaloalkyl (C_1-C_4), cyano, hydroxy, nitro, halogen (e.g. F, Cl, Br, I), lower alkoxy (C_1-C_4), lower perhaloalkoxy (C_1-C_4), unsubstituted amino, N-lower alkylamino (C_1-C_4) or N-lower alkylamino carbonyl (C_1-C_4);

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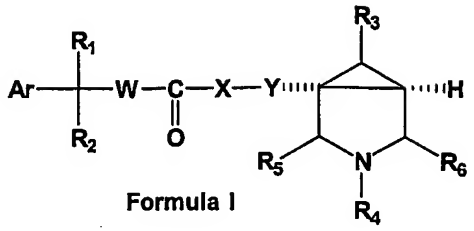
5. The method according to claim 4 wherein the disease or disorder is urinary incontinence, lower urinary tract symptoms (LUTS), bronchial asthma, chronic obstructive pulmonary disorders (COPD), pulmonary fibrosis, irritable bowel syndrome, obesity, diabetes or gastrointestinal hyperkinesis.

6. The method for treatment or prophylaxis of an animal or a human suffering from a disease of the respiratory, urinary and gastrointestinal systems, wherein the disease or disorder is mediated through muscarinic receptors, comprising administering to said animal or human, a therapeutically effective amount of the pharmaceutical composition according to claim 3.

7. The method according to claim 6 wherein the disease or disorder is urinary incontinence, lower urinary tract symptoms (LUTS), bronchial asthma, chronic obstructive pulmonary disorders (COPD), pulmonary fibrosis, irritable bowel syndrome, obesity, diabetes and gastrointestinal hyperkinesis.

8. A process for preparing compounds of Formula I,



Formula I

and their pharmaceutically acceptable salts, pharmaceutically acceptable solvates, esters, enantiomers, diastereomers, N-oxides, polymorphs, metabolites, wherein

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R_1 represents a hydrogen, hydroxy, hydroxymethyl, amino, alkoxy, carbamoyl or halogen (e.g. fluorine, chlorine, bromine and iodine);

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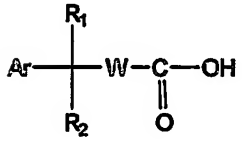
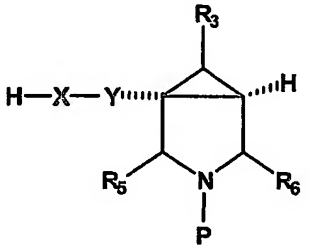
R_4 represents hydrogen, C_1-C_{15} saturated or unsaturated aliphatic hydrocarbon (straight chain or branched) in which any 1 to 6 hydrogen atoms may be substituted with the group independently selected from halogen, arylalkyl, arylakenyl, heteroarylalkyl or heteroarylalkenyl, having 1-2 hetero atoms selected from the group consisting of nitrogen, oxygen and sulphur atoms with an option that any 1 to 3 hydrogen atoms on an aryl or heteroaryl ring in said arylalkyl, arylalkenyl, heteroarylalkyl, heteroarylalkenyl group may be substituted with lower alkyl (C_1-C_4), lower perhaloalkyl (C_1-C_4), cyano, hydroxy, nitro, lower alkoxycarbonyl, halogen, lower alkoxy (C_1-C_4), lower perhalo alkoxy (C_1-C_4), unsubstituted amino, N-lower alkylamino (C_1-C_4), N-lower alkylamino carbonyl (C_1-C_4),

comprising

(a) reacting a compound of Formula II with a compound of Formula III

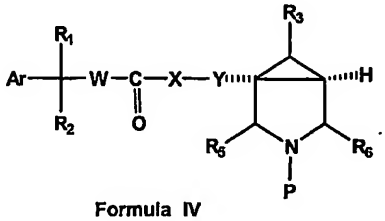


Formula II



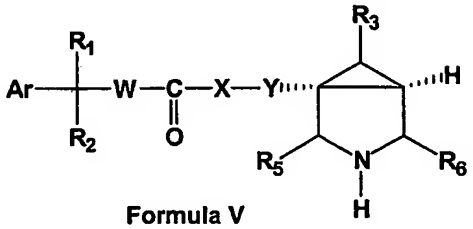
Formula III

in the presence of a condensing agent to give a compound of Formula IV,



Formula IV

(b) deprotecting the compound of Formula IV with a deprotecting agent to give a compound of Formula V, and



Formula V

(c) N-alkylating or benzylating the compound of Formula V with a compound of Formula LR_4, wherein L is a leaving group, to give compounds of Formula I.

9. The process according to claim 8 wherein P is selected from the group consisting of benzyl and t-butyloxy carbonyl groups.

10. The process according to claim 8 wherein the reaction of a compound of Formula III with a compound of Formula II to give compounds of Formula IV is carried out in the presence of a condensing agent which is selected from the group consisting of 1-(3-dimethyl aminopropyl)-3-ethyl carbodiimide hydrochloride (EDC) and 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU).

11. The process according to claim 8 wherein the reaction of a compound of Formula III with a compound of Formula II to give compounds of Formula IV is carried out in a suitable solvent selected from the group consisting of N,N-dimethylformamide, dimethylsulfoxide, toluene and xylene.

12. The process according to claim 8 wherein the reaction of a compound of Formula II with a compound of Formula III is carried out at temperatured ranging from about 0°C to about140°C.

13. The process according to claim 8 wherein the deprotection of a compound of Formula IV to give compounds of Formula V is carried out with a deprotecting agent selected from the group consisting of palladium on carbon, trifluoroacetic acid (TFA) and hydrochloric acid.

14. The process according to claim 8 wherein the deprotection of a compound of Formula IV to give compounds of Formula V is carried out in a suitable solvent

selected from the group consisting of methanol, ethanol, tetrahydrofuran and acetonitrile.

15. The process according to claim 8 wherein the N-alkylation or benzylation of a compound of Formula V to give compounds of Formula I is carried out with a suitable alkylating or benzylating agent, L-R_4 wherein L is any leaving group and R_4 is as defined earlier.

16. The process according to claim 15 wherein the leaving group L is selected from the group consisting of halogen, O-mestyl and O-tosyl groups.

17. The process according to claim 15 wherein the N-alkylation or benzylation of a compound of Formula V to give compounds of Formula I is carried out in a suitable organic solvent selected from the group consisting of N,N-dimethylformamide, dimethylsulfoxide, tetrahydrofuran and acetonitrile.